DOCUMENT RESUME

ED 328 419 SE 051 894

AUTHOR Edgerton, Richard T.
TITLE Survey Feedback from Secondary School Teachers that are Finishing their First Year Teaching from an Integrated Mathematics Curriculum.
PUB DATE 90
NOTE 21p.
PUB TYPE Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Integrated Curriculum; *Interdisciplinary Approach; *Mathematics Curriculum; Mathematics Education; Program Evaluation; Questionnaires; Secondary Education; *Secondary School Mathematics; Teacher Attitudes

ABSTRACT

This paper describes the adoption of an integrated mathematics curriculum for secondary school students. The decision to adopt this type of curriculum was based upon a one-year review of available curricula and involved many of the teachers that would be impacted, all secondary school mathematics department heads, and the district school board. As a way of determining the problems, issues, and indicators of success of the integrated mathematics adoption, the district surveyed the Integrated Mathematics I teachers near the end of the first year of the adoption. A majority of the teachers (83%) preferred to continue with the integrated program instead of returning to the traditional algebra, geometry, algebra/trigonometry sequence. The results and summary of that survey are included. Appended are a copy of the questionnaire and the numerical results. (KR)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED328419

SURVEY FEEDBACK FROM SECONDARY SCHOOL TEACHERS THAT ARE FINISHING THEIR FIRST YEAR TEACHING FROM AN INTEGRATED MATHEMATICS CURRICULUM

RICHARD T. EDGERTON
201 Miller Hall
DQ-12
University of Washington
Seattle, WA. 98195

SE051 894

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Richard T. Edgerton
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

A large Western United States school district chose to adopt a curriculum of integrated mathematics for its secondary school students. After a year-long process of selecting an integrated approach and choosing a text, institution of the first year of the program began. The selection process involved district teachers and administrators and was endorsed by the school board. The district's effected teachers were surveyed at the conclusion of the year to assess the program. The results of the survey included the response by a majority of the teachers (83%) to continue with the integrated program instead of returning to the traditional algebra, geometry, algebra/trigonometry sequence.

INTRODUCTION

Programs of integrated high school mathematics have been available for some time, but are poorly represented in available textual materials. New York State piloted integrated materials in 1974 and adopted an integrated curriculum in 1984 (Paul, 1986). Although there is some controversy about the adoption (Escobales & Rothenberg, 1986), there has been an increase in textual offerings over time. There was only one integrated mathematics text available at the time of the New York pilot, now there are at least five text series that claim to be integrated (series by AMSCO, Houghton Mifflin, Merrill, Scott-Foresman, and Saxon). Although the number of offerings is increasing, "traditional" materials for high school mathematics remain in far greater abundance.

By "integrated mathematics", it can be generally accepted to mean "a blended sequence of secondary mathematics topics organized in such a way that it includes the topics of first year algebra, geometry, and second year algebra/trigonometry, but eliminates the year long study of these subjects as discrete courses" (Beal, Dolan, Lott, & Smith, 1990). The National Council of Teachers of Mathematics (NCTM) recommends a curriculum that is connected rather than one that is segmented in its Standards document (NCTM, 1989), reinforcing a curriculum of integrated mathematics.

Of consideration in the adoption of integrated high school mathematics materials is how a break from the traditional algebra, geometry, algebra/trigonometry approach would be accepted by seasoned mathematics teachers. In the surveyed school district, all but a few mathematics teachers had taught at least twenty years with many only a few years from retirement. The surveyed district also had a history of budgetary problems and consequently issued "reduction in force" (RIF) notices yearly to a large number of teachers with many teachers being laid off only to be rehired the following autumn. This policy naturally promoted skepticism and distrust

among the district teachers. Most of the district teachers are survivors of that history and that fact may color their views regarding educational issues, such as the adoption of a mathematics curriculum that is organized in a non-traditional way. The acceptance of the apparent change in alignment by the districts' teachers was of interest not only to the surveyed district but also to neighboring school districts.

The school district that was involved in this study chose a curriculum of integrated mathematics for its secondary schools to be instituted in the 1988–1989 school year. The decision to adopt this type of curriculum was based upon a one-year review of available curricula and involved many of the teachers that would be impacted, all secondary school mathematics department heads, and the district school board. The adopted curriculum was the text series Unified Mathematics, published by the Houghton Mifflin Company. The series is composed of three volumes, Unified Mathematics Books I, II and III. The series was introduced in the 1988–1989 school year beginning with the students first course in high school mathematics, usually as high school freshmen, and using the text Unified Mathematics Book I. In successive years, the next two books in the series are to be introduced as the students advance to the next year's course in mathematics.

The school district in which this adoption was instituted has ten 4-year high schools and ten middle schools, which serve grades 5 – 8. The Unified Mathematics text series was targeted for use by "advanced" 8th grade students and all high school students that were to take first-year high school mathematics. In many cases, Sophomores, Juniors and even some Seniors took Integrated Mathematics I, the first course in the three-year series, in its first year of adoption.

As a way of determining the problems, issues, and indicators of success of the integrated mathematics adoption, the district surveyed the Integrated Mathematics I teachers near the end of the first year of the adoption. The results of that survey are

reported herein with a copy of the questionnaire given in Appendix A and the numerical results shown in Appendix B. A report of the findings of the study follows.

RESULTS

The survey was sent to all 63 of the Integrated Mathematics I teachers in the school district. Of the 63, 47 teachers completed and returned the survey (75% return). 51 of the 63 teachers were teaching within the ten high schools and 12 of the 63 teachers were teaching within the ten middle schools in the district. There were 43 high school surveys returned (91%) and 4 middle school surveys returned (33%). To insure anonymity of the respondents, neither name nor school was requested on the survey.

One of the issues addressed by the survey was the teachers' preparation in mathematics content and pedagogy in relation to the demands of teaching this curriculum. Virtually all teachers surveyed reported that they felt that they had an adequate mathematics background to teach integrated mathematics. All but six teachers reported at least a mathematics minor and within that six, only two did not report having some college preparation in mathematics beyond 18 quarter hours. Most teachers also reported that they had sufficient backgrounds in mathematics (87%) and educational methods (60%) to teach this curriculum, however, fewer (53%) felt that there was sufficient support in the form of workshops and meetings to aid in the transition into this curriculum. Many teachers felt that help was needed in the area of workshops and meetings (45%) and about a third of the teachers surveyed commented that there should be more building and district-wide meetings and that they should include discussions of pacing of the curriculum, work with support materials and overall coordination of the program. There were no requests for workshops on how to teach and little stress on the need for more mathematics courses. This would seem to support the teachers' initial assertion that they had adequate backgrounds in mathematics content and pedagogy.

Most teachers (62%) responded to a question on the make-up of integrated mathematics. Generally, most teachers responding felt that integrated mathematics should contain a variety of subjects such as algebra, geometry and probability, which mirrors the design of the adopted text. A few respondents (five) indicated that an improved text that included better applications and more integration would be preferable, however, no one identified their district's program of integrated mathematics as different from their view of integrated mathematics.

The perception of student mastery was negatively reported with most (64%) of the teachers not satisfied with their students' mastery. Details were given by 31 respondents, citing the pace of the curriculum as being too fast for most of the students, the lack of student motivation and basic skills, poor student attendance and an informal agreement among the teachers in the district to "teach for exposure and not mastery". Some positive remarks were also found. There were references to the advantage of a spiraled approach that the text series would provide, the perception of a more comprehensive view of mathematics would be obtained by students, and teacher optimism for next year's program. In comparing the positive and negative reports, teachers appeared to be troubled by an apparent lack of achievement by their students but generally expected overall understanding to improve with students' subsequent enrollment in integrated mathematics.

The adopted textual materials Unified Mathematics from the Houghton Mifflin Company was supplemented by most teachers (66%). The source of the supplement ranged from teacher made materials to materials from other texts and programs. Identified sources included Algebra With Pizzaz, Making Practice Fun and activities from The Mathematics Teacher. The rating of the text itself was more positive, with 81% saying that it was appropriate for the course. Teachers rated nearly every category concerning the textual materials a mean of at least 3.0 on a scale of 1 (low) to 5 (high). The exception to the 3.0 average was the rating given the quality of the

supplemental materials, which had a mean of 2.4. The consistency of the moderate to strong ratings given the text by the teachers suggests that the text was considered as acceptable. In the materials rating section, the teachers also reiterated an earlier appeal for better, more integrated materials.

In an overall assessment, teachers felt that the integrated mathematics program was a moderate success (average of 3.0 on a scale of 1 (low) to 5 (high)). Only five teachers (11%) indicated that they would prefer to return to the previous curriculum which was a non-integrated (traditional) curriculum. Most of the responses from the 36 respondents were positive, with most asserting that an integrated approach is a good idea, a little time is needed for teachers to become accustomed to the material and student achievement will benefit in the long run.

SUMMARY

At the conclusion of the first year of an integrated program in mathematics at the secondary school level in the surveyed school district, teachers responded with moderate enthusiasm concerning their perceptions of the program. Although teachers felt that their backgrounds in mathematics and pedagogy prepared them for this curriculum, there was general desire for more meetings and workshops to aid in the coordination of the program. The text was rated adequate with the support materials receiving a slightly lower average score. There were no extremes either way concerning the program, with most preferring to continue the program rather than to return to the previous curriculum. Many felt that an integrated approach to mathematics was a good idea and that it will improve student achievement.

In light of teachers' demographics, acceptance of a curriculum that is radically different from their preparation and past teaching is extremely encouraging. Teachers' involvement in the decision process and the act of teaching the integrated curriculum probably worked together to ease the transition from the familiar "traditional" approach to mathematics to one that is designed to be more connected.

To further enhance the transition process to integrated mathematics, more support through workshops on specific aspects of the curriculum would need to be offered. Additionally, teachers would benefit from more contact with others that are sharing the same experiences in their own buildings, across the district, and with teachers from other districts in which integrated mathematics is used.

REFERENCES

Beal, J. L., Dolan, D. , Lott, J. & Smith, J. P., (1990) Integrated Mathematics: Definitions and Issues. Montana Council of Teachers of Mathematics.

Escobales, R. H. & Rothenberg, R. I. (1986). Another view. Mathematics Teacher, 79, 498.

National Council of Teachers of Mathematics. (1989). Curriculum And Evaluation Standards For School Mathematics. Prepared by the working groups of the Commission on Standards for School Mathematics of the National Council of Teachers of Mathematics. Reston, VA: National Council of Teachers of Mathematics.

Paul, F. (1986). An integrated approach for secondary school mathematics. Mathematics Teacher, 79, 236-238.

APPENDIX A

X SCHOOL DISTRICT
Integrated High School Mathematics Study
Teacher Questionnaire
May, 1989

NOTE: *This is a re-creation of the survey for the purposes of this report. The only differences between this and the survey given the teachers is that the original offered more space for open-ended responses and included the school district name.*

In an effort to strengthen our program district-wide, we would like your impressions on various aspects of our first year in the implementation of an integrated curriculum. Please circle the response that correctly answers the question for you or provide the correct response in the given space if it is not among the options.

Thank you for taking the time for this survey.

1. Number of semesters of integrated math that you have taught? 1----------2

2. Undergraduate minor in mathematics YES----NO
   If less, how many quarter credits?

3. Undergraduate major in mathematics? YES----NO

4. Masters degree in mathematics? YES----NO

5. Masters degree in mathematics education? YES----NO

6. Are you a high school or middle school teacher? HS------MS

7. Did your mathematics background prepare you
   to teach this curriculum? YES----NO
   If no, what was missing?

8. Did your educational methods background prepare you to teach this curriculum? YES----NO

   If no, what was missing?

9. Were you involved in the decision to adopt this curriculum? YES----NO

10. Does this curriculum adequately accommodate transfer students? YES----NO

11. Did you have sufficient preparation (such as workshops and meetings) to aid your transition into this curriculum? YES----NO
    If no, what was missing?

12. Do you still need help in these areas? YES----NO
    If yes, then what do you need?

13. In your opinion, what are the components of an integrated mathematics program?

14. If your view of an integrated program in mathematics is different from the one adopted in **X**, what are those differences?

15. Were you satisfied with the degree of mastery attained by the majority of your students?
    Please explain your position. YES----NO

16. Did you supplement the text? YES----NO
    If so, then with what kinds of materials?

17. Overall, was the text appropriate for the course? YES----NO

Please rate the textbook by circling one of the numbers using the scale:	1----2----3----4----5 (low) (high)
Organization of the text?	1----2----3----4----5
Supplementary materials:	
Availability	1----2----3----4----5
Quality	1----2----3----4----5
Interest to students?	1----2----3----4----5
Interest to you?	1----2----3----4----5
Integration of topics?	1----2----3----4----5
Application to other disciplines?	1----2----3----4----5

18. How successful was the program this year? 1----2----3----4----5

19. Would you prefer to return to the previous program rather than continue with the integrated mathematics sequence? YES----NO
Why or why not?

APPENDIX B

The following is the raw data obtained from the questionnaires along with a listing of the comments given in the free-response areas. When more than one person gave a particular response, a numeral follows the comment to show the number of those making that response. The heading "Blank" indicates the number of surveys that had no response for that question.

1. Number of semesters of integrated math that you have taught?

RESPONSE	1	2
NUMBER	3	44
PERCENT	6	94

2. If less than undergraduate minor, how many quarter credits?

RESPONSE	YES	NO	Blank
NUMBER	16	28	3
PERCENT	34	60	6

4 RESPONDENTS
Science/Math
66+
30+
12 plus 2 stat courses

3. Undergraduate major in mathematics?

RESPONSE	YES	NO	Blank
NUMBER	29	18	0
PERCENT	62	38	0

4. Master's degree in Mathematics?

RESPONSE	YES	NO	Blank
NUMBER	5	40	2
PERCENT	11	85	4

2 RESPONDENTS
master's and PhD in phil. , graduate work in symbolic logic
credits but not the degree, all required classes

5. Master's degree in mathematics education?

RESPONSE	YES	NO	Blank
NUMBER	5	40	2
PERCENT	11	85	4

2 RESPONDENTS
26 credits (underlined "education")
amended to "science/mathematics education"

6. Are you a high school or middle school teacher?

RESPONSE	HS	MS	Blank
NUMBER	43	4	0
PERCENT	91	9	0

1 RESPONDENT
physics major

7. Did your mathematics background did not prepare you to teach this curriculum? If no, what was missing?

RESPONSE	YES	NO	Blank
NUMBER	41	6	0
PERCENT	87	13	0

5 RESPONDENTS
probability-2
statistics-2
logic-2
(circled "YES") In terms of subject matter

8. Did your educational methods background prepare you teach this curriculum? If no, what was missing?

RESPONSE	YES	NO	Blank
NUMBER	28	16	3
PERCENT	60	34	6

9 RESPONDENTS
Methods classes were not helpful-4
Experience is best teacher
How to cope with HS kids at elementary level
Sequence of topics
No ed course available
Techniques for illustrating difficult concepts

9. Were you involved in the decision to adopt this curriculum?

RESPONSE	YES	NO	Blank
NUMBER	32	15	0
PERCENT	68	32	0

1 RESPONDENT
Was anyone?

10. Does this curriculum adequately accommodate transfer students?

RESPONSE	YES	NO	Blank
NUMBER	28	8	11
PERCENT	60	17	23

13 RESPONDENTS
In district, yes-3
OK, had none-2
Not sure-2
Some problems (circled "YES")
Difficult to place them
Out of district, yes with reservations

No worse than previous curriculum
Depends on the kind of program they came from
Doubtful

11. Did you have sufficient preparation (such as workshops and meetings) to aid your transition into this curriculum? If no, what was missing?

RESPONSE	YES	NO	Blank
NUMBER	25	20	2
PERCENT	53	43	4

16 RESPONDENTS
Time schedule-5
More meetings with building staff-4
More meetings with other building staffs-3
Guidance on what to stress/omit-3
Testing-3
Pilot program-3
Straight talk about student difficulties
How to grade such a fast moving course
Time spent on attainments
We need all the help that we can get
Workshop for Pre-Integrated
Logic
How are topics reintroduced/emphasized in future years
More time to look at the material
Not needed

12. Do you still need help in these areas? If yes, then what do you need?

RESPONSE	YES	NO	Blank
NUMBER	21	24	2
PERCENT	45	51	4

17 RESPONDENTS
More meetings with other district math teachers-7
More meetings with building staff-4
Probability-3
Tests-3
Logic-3
Compare what works, what is important-2
More supplementary materials-2
Meetings with other districts-2
Paid time to plan the program throughout the year
Motivational techniques
Smaller units
Uniform expectations for credit
Time to re-do assignment sheets
Time to improve pacing.
Regularly scheduled topically focused workshops.

13. In your opinion, what are the components of an integrated mathematics program?

29 RESPONDENTS
Algebra-14
Geometry-12
Logic-11
Probability-9
Statistics-8
Trigonometry-8
Algebra and geometry merged-4
The weaving of various areas in math into one unified curriculum-4
Computation-3
Ideas presented as needed, not compartmentalized-3
Variety of topics covered at each level-2
Spiraled approach-2
Use of calculators-2
Concept of math as whole-2
Advanced algebra
Computer exercises
Educated with integrated math in Taiwan.
Components of present program.
Geometry spread out over 3 years.
Text merely inserted chapters from other texts in new order: not really integrated math but at least a start.
Presently adopted curriculum is adequate
Taught by math majors
Number theory
Practical math (consumer with applications)
Transformational geometry
Set theory

14. If your view of an integrated program in mathematics is different from the one adopted in X, what are those differences?

13 RESPONDENTS
They are virtually the same-6
X's is OK
The text should be rewritten to truly integrate the topics.
Discovery as related to problem solving could have been provided.
Consumer math applications
Agree with topics, would like more flexibility on which to emph.
Too much to cram into one year
Units for each skill level with applications
Try to show more interrelatedness

15. Were you satisfied with the degree of mastery attained by the majority of your students? Please explain your position.

RESPONSE	YES	NO	Blank
NUMBER	4	30	3
PERCENT	30	64	6

31 RESPONDENTS
Curriculum moved too fast-7
Lack of student motivation-6
Exposure was desired-4
Lack of student basic skills-3
Teacher expectations have always been higher than student achievement-2
Too spotty presentation.
Adopted text poor choice.
Students should pass placement test to be in I M.
Student receives overall spiral practice.
Too many low achievers.
Most students developed comprehensive view and mastered skills.
Students did little homework.
More time needed to develop some topics.
Too many absences
Too many 10-12 graders.
Problems when too much was expected.
Mastery improved when reverted to expectations of Algebra
Develops curiosity and motivation with variety.
Text, idea great, mastery was zilch
Need better tests
Kids failed tests, could do the work 3 chapters later
Mastery with extra tutorial help
Will prepare well for advanced math
Some better than others: good- logic, alg, stat; less good: geometry, and probability
Low student ability
Student unfamiliarity with remembering rules, relationships and relating them later
The program assumes average student motivation
Unaware of which topics would receive more detail in I M II
Poor selection of students, should improve next year
Yes, with exception of logic

16. Did you supplement the text? If so, then with what kinds of materials?

RESPONSE	YES	NO	Blank
NUMBER	31	15	1
PERCENT	66	2	2

31 RESPONDENTS
Worksheets-12
Materials from Algebra I and II-5
Teacher made tests-5
Algebra With Pizzaz-2

Materials provided with text-2
Traditional basic math texts.
Resource book more helpful and better organized than text.
Very little, some related concepts to complete text.
Newspaper ads
Visual aids
In places where text presented too much too fast.
Making Practice Fun
"Intro To Integrated" materials
No, perhaps Math In the Mind's Eye would be useful.
The Mathematics Teacher
Computer exercises from other texts
"Hands on" exercises
With ideas from teacher's experience
When is it possible?
Algebra Structure and Function for factoring
Human endeavor

17. Overall, was the text appropriate for the course?

RESPONSE	YES	NO	Blank
NUMBER	38	4	5
PERCENT	81	9	11

Please rate the textbook by circling one of the numbers using the scale

RESP	1	2	3	4	5	Blank	mean
NUMB	0	3	9	13	5	17	3.7
%	0	6	19	28	11	36	--

Organization of the text?

RESP	1	2	3	4	5	Blank	mean
NUMB	1	3	7	25	8	3	3.8
%	2	6	15	53	17	6	--

2 RESPONDENTS
Ask again in 2 years
Important topics, problems not emphasized

Supplementary materials:
Availability:

RESP	1	2	3	4	5	Blank	mean
NUMB	3	7	16	14	4	3	3.2
%	6	15	34	30	9	6	--

Quality:

RESP	1	2	3	4	5	Blank	mean
NUMB	15	8	12	5	3	4	2.4
%	32	17	26	11	6	9	--

8 RESPONDENTS
Tests of poor quality, inappropriate-3
Unusable-2

Merril test materials might help
Poorest I have seen
Quizzes, tests, worksheets all high quality

Interest to students?

RESP	1	2	3	4	5	Blank	mean
NUMB	1	6	21	17	1	1	3.2
%	2	13	45	36	2	2	--

Interest to you?

RESP	1	2	3	4	5	Blank	mean
NUMB	0	2	9	17	18	1	4.1
%	0	4	19	36	38	2	--

Integration of topics?

RESP	1	2	3	4	5	Blank	mean
NUMB	0	4	8	21	12	2	3.9
%	0	9	17	45	26	4	--

Application to other disciplines?

RESP	1	2	3	4	5	Blank	mean
NUMB	2	10	16	13	0	6	3.0
%	4	21	34	28	0	13	--

18. How successful was the program this year?

RESP	1	2	3	4	5	Blank	mean
NUMB	5	6	19	12	2	3	3.0
%	11	13	40	26	4	6	--

2 RESPONDENTS
OK, considering no pilot program
Can tell only after 3 more years

19. Would you prefer to return to the previous program rather than continue with the integrated mathematics sequence? Why or why not?

RESPONSE	YES	NO	Blank
NUMBER	5	39	3
PERCENT	11	83	6

36 RESPONDENTS
I M is doing well, teachers need time to master materials-9
Integration is good way to teach math--6
Merril may have been more appropriate for "regular" students-3
Previous was more appropriate-3
Students know more math now than under previous program-3
Better text needed-3
Check results after 3 years-2
Adjust the pace-2
Students enjoyed changing topics-2
Previous program had flaws-2
May not be appropriate for the "masses"-2

I need more time to evaluate the pros/cons
The course needs refining
More administrative, home support needed overall
Try harder, bring in parents better
Bright kids like the course
More computer exercises with standard computer books
Things seem to be more correlated than before
Thought provoking problems
We are on the right track
Good introduction to topics
Should find way to assist students that are new to district in mid-year
Students happier, 99% more successful in previous curriculum
After 2-3 years, greater understanding will show
I have been doing it on my own
I have been wanting this for years
Variety allows opportunity for students to be successful in areas where their abilities allow them to do so
Fun to teach